

CLAIMS:

1. A pointing device comprising a ring-like magnet that is movably supported in parallel to a plane; and a plurality of magnetic sensors  
5 for detecting magnetic flux density produced by said ring-like magnet in a direction parallel to the plane, wherein said magnetic sensors detect variations in the magnetic flux density in the direction parallel to the plane, the variations being caused by movement of said ring-like magnet.
- 10 2. The pointing device as claimed in claim 1, wherein said ring-like magnet is internally and externally unipolarly magnetized.
3. The pointing device as claimed in claim 1, wherein said ring-like  
15 magnet has at least one of its internal wall and external wall magnetized in a multipolar manner, and said magnetic sensors are faced to a magnetic pole center of said ring-like magnet magnetized in a multipolar manner.
4. The pointing device as claimed in claim 1, 2 or 3, further comprising  
20 a printed circuit board on which a resin layer is provided, wherein said ring-like magnet is fixed to said resin layer, and said magnetic sensors are placed on said printed circuit board.
5. The pointing device as claimed in claim 4, wherein said resin layer  
25 and said printed circuit board have their opposing faces not bonded to each other.

6. The pointing device as claimed in claim 4 or 5, wherein said resin layer is an elastic sheet.

7. The pointing device as claimed in claim 4, 5 or 6, wherein said  
5 resin layer is a silicone resin.

8. The pointing device as claimed in any one of claims 1-7, wherein said magnetic sensors are disposed symmetrically on X and Y axes, which are two axes on a two dimensional plane of an orthogonal system,  
10 and said ring-like magnet is placed near the center of said magnetic sensors.

9. The pointing device as claimed in any one of claims 4-8, further comprising a switch on the resin layer side of said printed circuit  
15 board and at about the center of said ring-like magnet.

10. The pointing device as claimed in claim 9, further comprising a projection for depressing said switch at a portion facing said switch on said resin layer.

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11. The pointing device as claimed in any one of claims 1-10, wherein said magnetic sensors are magnetic sensors utilizing Hall effect, and the output signals are proportional to the magnetic flux density.

25 12. The pointing device as claimed in claim 11, wherein said magnetic sensors utilizing the Hall effect are disposed on the resin layer side of said printed circuit board to detect the magnetic flux density

in a direction parallel to the surface of said printed circuit board.

13. The pointing device as claimed in claim 11 or 12, wherein said magnetic sensors utilizing the Hall effect are magnetic sensors with  
5 a single output terminal.

14. The pointing device as claimed in any one of claims 1-10, wherein said magnetic sensors are magnetic sensors utilizing  
magneto-resistive effect.

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15. The pointing device as claimed in claim 14, wherein said magnetic sensors utilizing the magneto-resistive effect are semiconductor magneto-resistive elements which are disposed on the resin layer side of said printed circuit board to detect the magnetic flux density  
15 in a direction parallel to the surface of said printed circuit board.

16. The pointing device as claimed in claim 14 or 15, wherein said magnetic sensors utilizing the magneto-resistive effect are four semiconductor magneto-resistive elements disposed symmetrically on  
20 X and Y axes, which are two axes on a two dimensional plane of an orthogonal system, wherein two magnetic sensors on the X axis are electrically connected at a first connection point; and two magnetic sensors on the Y axis are electrically connected at a second connection point, and wherein said pointing device detects variations in ambient  
25 magnetic flux density caused by movement of said ring-like magnet using electric signals at the first and second connection points.

17. The pointing device as claimed in any one of claims 1-16, further comprising an origin returning means for returning said ring-like magnet to the origin using magnetic force generated by said ring-like magnet.

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18. An electronic device incorporating the pointing device as defined in any one of claims 1-17.